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HUME'S ANSWER TO BAYLE ON THE VACUUM

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Hume's discussion of space in the *Treatise* addresses two main topics: divisibility and vacuum. Concerning the former, Hume argues that spatially extended things of finite size are not infinitely divisible; instead, they are composed of finitely many colored or tangible points (T 1.2.2.1–5/29–31, 1.2.4.3/40).¹ Concerning the latter, he argues that we cannot conceive of a vacuum (T 1.2.4.2/39–40, 1.2.5.1/53).

It is widely recognized that Hume's discussion of divisibility contains an answer to Bayle.² In his *Dictionary* article "Zeno of Elea," Bayle presents an argument about

¹ Hume's works are cited as follows. References to 'T' are to Hume 2007, followed by book, part, section and, where appropriate, paragraph number (references to paragraphs of Hume's "Abstract of a Book Lately Published" are preceded by 'Abs'). References to 'E' are to Hume 2000, followed by section and paragraph number. These references are followed by the corresponding page numbers in Hume 1978 and 1975, respectively, set off by a slash mark. References to 'LDH' are to Hume 1932, followed by letter number, then volume and page numbers.

² See Allison 2008: 39–40, Baxter 2009: 128–31, Falkenstein 2006: 60, Flew 1976: 264 and 268–69, Fogelin 1985: Chapter 3, Jacquette 2001: 22–28 and 114–17, Johnson 1995: 28, Kemp Smith 1941: 284–88 and 325–38, and Wright 1983: 92–94.

divisibility as support for fideism.³ Hume aims to undermine this support by showing that Bayle's argument is unsound. It is not so widely recognized that, elsewhere in the same article, Bayle presents arguments about *vacuum* as further support for fideism.⁴ To undermine Bayle's case for fideism, Hume must answer these further arguments.

This paper has two goals. First, I aim to show that Hume's discussion of vacuum contains an answer to Bayle. Key to this answer is a distinction between two ways in which vacuum was conceived in the early modern period: i) as a genuine thing that has spatial properties, and yet is immobile, indivisible and penetrable (*positive vacuum*); ii) as a mere absence of spatial things (*privative vacuum*). As I interpret him, Hume holds that this distinction serves to undermine Bayle's vacuum-based arguments for fideism. Second, I aim to show that this interpretation allows for a novel defense of Hume against a long-standing objection: that he is inconsistent, in denying that we can conceive of a vacuum, while allowing that we can conceive of what he calls "invisible and intangible distance" (T 1.2.5.16/59). As I interpret him, Hume consistently denies that we can conceive of a *positive vacuum*, while allowing that we can conceive of two or more sensible objects' being arranged so as to have *privative vacuum* between them.

³ Some scholars doubt whether Bayle is a fideist. However, he certainly *presents* certain arguments *as* supporting fideism; whether he does so sincerely is another matter that I will not address here. For a helpful survey of approaches to Bayle on the (ir)rationality of religious belief, see Irwin 2013.

⁴ Of the scholars cited in n.2, only Johnson, Kemp Smith and Wright mention Bayle's views on vacuum. None of them mentions that Bayle presents arguments about vacuum as support for fideism, or that Hume would wish to resist these arguments.

I proceed as follows. §1 presents Bayle’s familiar divisibility-based argument for fideism and Hume’s answer to it. §2 presents Bayle’s less-familiar vacuum-based arguments for fideism and the distinction between positive and privative vacuum. §3 reconstructs Hume’s answer to these arguments. §4 defends him against the long-standing objection.

Some scholars identify philosophers other than Bayle as Hume’s targets in his discussion of vacuum. Miren Boehm (2012: 94–96) and Don Garrett (1997: 54–55 and 2015: 66–67) argue that Hume targets Newtonian philosophers who purport to believe in absolute space. More specifically, Paul Russell argues that Hume’s main target is Samuel Clarke, who uses the premise that there is absolute space in his “argument *a priori*” for God’s existence (2008: Chapter 9). My interpretation is not in competition with these: perhaps Hume means to target both the Newtonians and Bayle,⁵ and to undermine both Clarke’s rational theology and Bayle’s fideism. In fact, my argument provides further evidence that Hume’s discussion of space is meant to serve his broader irreligious agenda (Russell 2008: 109–12).

§1 Bayle on divisibility and Hume’s answer

Bayle’s article “Zeno of Elea” has two main philosophical goals: first, to defend Zeno’s four paradoxes of motion against Aristotle’s objections (Bayle does this in Remark F); second, to supplement these paradoxes with further arguments that nothing moves, which Zeno could have given (Bayle does this in Remarks G and I). Bayle’s use of these

⁵ For the view that Hume’s discussion of space and time engages with both Newton and Bayle, see Baxter 2009: 127–31. Baxter does not observe that Hume’s discussion of *vacuum*, specifically, engages with Bayle.

arguments is subtle. He finds no fault in them, but does not accept their conclusion (1991: 372). Instead, from our inability to answer them, he concludes that we do not understand motion (1991: 372). In a section of Remark G headed “What use ought to be made of the preceding dispute,” he quotes and endorses a passage by Arnauld and Nicole claiming that such unanswerable arguments serve religion in two ways. First, they “check [our mind’s] presumption and . . . keep it from ever being foolhardy enough to oppose its feeble light to the truths that the Church proposes” (*Logic*, Part IV, Chapter i; quoted in Bayle 1991: 372). Second, they undermine the view that we should not believe in God because we cannot understand Him: we cannot consistently take this view, because we believe in motion even though we cannot understand it (Bayle 1991: 372). So, as Bayle presents them, his arguments against motion support fideism. We all accept the existence of motion as an article of faith, even though reason speaks against it. What obstacle, then, to accepting the existence of God as an article of faith, even though reason speaks against it, too?

“Zeno of Elea,” Rem. G, presents several arguments that nothing moves. The first concerns divisibility. Bayle argues that only extended things can move (1991: 359). He then argues that there are no extended things, on the grounds that there is no satisfactory account of divisibility (1991: 359). He presents a trilemma (1991: 359, 362): either extended things are “infinitely divisible,” meaning that every part is divisible into further parts (1991: 363, 364); or they are divisible into “mathematical points,” i.e. *extensionless* indivisible parts (1991: 359–60); or they are divisible into “physical points” or “Epicurean atoms,” i.e. *extended* indivisible parts (1991: 359–60). Bayle argues that none of these options is tenable (1991: 359–68). He infers that there are no extended things, so nothing moves (1991: 359).

In a letter to his friend Michael Ramsay of August 26/31, 1737, Hume recommends “the more metaphysical Articles of Bailes [*sic*] Dictionary; such as those [. . . of] Zeno, & Spinoza” as an aid to understanding “the metaphysical Parts” of his reasoning in the *Treatise*.⁶ Hume’s engagement with Bayle is evident throughout his discussion of space and time (and elsewhere). For example, he borrows his “additional argument” concerning time (T 1.2.2.4/31) from Bayle’s article on Zeno (Bayle 1991: 353–54; see Baxter 2008: 27–29); his “burning coal” example (T 1.2.3.7/35) may be inspired by Bayle (for evidence, see Larivière and Lennon 2002); he follows Bayle in discussing the scholastic view that points are mixed into infinitely divisible matter (compare T 1.2.4.15/44 with Bayle 1991: 370; see Kemp Smith 1941: 301); and his discussion of Spinoza (T 1.4.5.17–28/240–46) is indebted to Bayle’s article “Spinoza,” which Hume cites (T 1.4.5.22n/243n).⁷

⁶ Popkin 1964 reproduces this letter. An earlier letter to Ramsay indicates that Hume had a work of Bayle’s in 1732 (LDH 2: I.12). J. Y. T. Greig (LDH 2: I.12n) and J. P. Pittion (1977: 373) say this was likely a copy of the *Dictionary*.

⁷ In addition, Hume’s memoranda (published in Mossner 1948) show significant engagement with Bayle’s views: see, especially, entries 4–8, 10, 11, 16, 19, 21, 28–30, and 32–34 in the section entitled “Philosophy,” which Mossner numbers “II” (Mossner 1948: 500–502). However, the memoranda’s date of composition is disputed. Mossner (1948: 493–6) and Pittion (1977: 383) argue that the memoranda predate the *Treatise*. But Stewart (2000: 276–88) argues that Hume started work on them only after finishing his main work on the *Treatise*, and Sakamoto (2011) argues that he wrote them in the late 1740s and early 1750s; in either case, the memoranda provide no evidence as to the extent of his engagement with Bayle whilst working on the *Treatise*. Miller (2013) challenges one of Sakamoto’s key pieces of evidence, and claims the memoranda were likely composed “sometime between the mid-1730s and early 1740s” (2013, 201).

There can be little doubt that Hume saw himself as answering Bayle’s divisibility-based argument for fideism. He explicitly considers Bayle’s trilemma between “the infinite divisibility of matter,” “the non-entity of mathematical points,” and “[t]he system of *physical* points,” which Hume regards as a “medium” between the two former options (T 1.2.4.3/40). He replies that Bayle’s argument fails because it overlooks a fourth account of divisibility. In addition to the “system of *physical* points”—which Hume agrees is “absurd”—there is *another* “medium” between infinite divisibility and mathematical points: extended things are divisible into extensionless points that are colored or tangible (T 1.2.4.3/40).⁸ Bayle does not consider this account of divisibility, and Hume regards the “absurdity” of the other three as “a demonstration of the truth and reality of this medium” (T 1.2.4.3/40); as Dale Jacquette nicely puts it, Hume re-channels the force of Bayle’s trilemma into proving his own view of divisibility (2001: 27).

This answer to Bayle invites an obvious objection, which also applies to the mathematical points account: extensionless points cannot compose something extended.⁹ Others have answered this objection on Hume’s behalf,¹⁰ so it need not detain us here.

⁸ Hume vacillates about how best to express this answer to Bayle. He introduces it as a fourth account of divisibility (T 1.2.4.3/40), but goes on to write as if it were a version of the mathematical points account (T 1.2.4.4–6/40–41). In the first *Enquiry*, he describes his view as a version of the physical points account (E 12.18n/156). In describing it as a fourth account, I follow Allison 2008: 40 and 345n9, Fogelin 1985: 31 and Jacquette 2001: 26. Jacquette helpfully compares the *Treatise* and first *Enquiry* on divisibility (2001: Chapter 7).

⁹ Bayle perhaps means to give this objection: “several nonentities of extension joined together will never make up an extension” (1991: 359–60).

¹⁰ For example, see Allison 2008: 40–44, Baxter 2009: 120 and 129–31, and Falkenstein 2015: 37–39.

§2 Bayle on the vacuum

Remark I to “Zeno of Elea” contains two further arguments that nothing moves. They are “based upon the distinction between a plenum and the vacuum” (1991: 377). Bayle claims to be “sure that [Zeno] did not forget” these arguments: Melissus gave them and “since Zeno rejected the vacuum, I cannot but think that he would have made use of the same proof as Melissus employed against those who admitted motion” (1991: 377–78). As in Remark G, Bayle claims that his Zenonian arguments are unanswerable: “we ought to conclude that the objections [to motion] raised by Zeno cannot be resolved” (1991: 382; here, Bayle assumes that Zeno actually did raise these objections concerning the vacuum). Also, as in Remark G, Bayle claims that our inability to answer these arguments shows that we do not understand their subject matter: “if [Zeno] did not quite silence his opponents, he would at least force them to admit that they do not know or understand what they are talking about” (1991: 382). We have seen Bayle claim that such unanswerable arguments provide support for fideism (§1). So, he presumably takes Remark I’s arguments about the vacuum to provide the same kind of support for fideism as Remark G’s argument about divisibility. To undermine Bayle’s overall case for fideism, Hume must answer these further arguments.

Bayle’s main argument in Remark I concerns the *nonexistence* of a vacuum and motion: “If there were motion, it would be necessary that there be a vacuum; now there is no vacuum; therefore, etc.” (1991: 377). Let us call this the Nonexistence Argument:

[N1] Motion requires a vacuum.

[N2] There is no vacuum.

Therefore,

[N3] There is no motion.

Bayle supports [N1] by claiming that recent advances in mathematics and natural philosophy due to “Huygens, Newton, etc.” have proven it (1991: 378–79, 378n111).¹¹ He gives two reasons in support of [N2]. First, the existence of a vacuum is contrary to our clear and distinct idea of extension, which is among “the most evident notions we have in our understanding” (1991: 379). This idea represents extension as having the “inseparable properties or attributes” of “divisibility, mobility, and impenetrability” (1991: 379). If there were a vacuum, however, it would be something extended that essentially has the contrary properties: indivisibility, immobility and penetrability (1991: 379).¹² So, there is no vacuum. Second, if there were a vacuum, it must be either a substance or a mode because “the adequate division of being includes only these two possibilities” (1991: 379). But, Bayle argues, a vacuum can be neither a substance nor a mode (1991: 379–80). So, again, there is no vacuum.

¹¹ Bayle seems to owe this point to Nicolas Fatio de Duillier. See Bayle 1991: 137 and 379, and Labrousse 1983: 89. Todd Ryan presents evidence that Bayle did not accept [N1] himself (2009: 19–20); his use of it here may be opportunistic.

¹² See also “Leucippus,” Rem. G (Bayle 1991: 138); for discussion, see Ryan 2009: 67–68.

Each of these reasons in support of [N2] assumes that a vacuum must be *something* or, in Bayle's terminology, "a positive being" (1991: 380). The first reason assumes that a vacuum must be *something extended*; the second, that it must be a "*being*," hence either a substance or a mode.

The same assumption informs a second argument, suggested by other passages in Bayle's article, which focuses on the *inconceivability* of motion and vacuum rather than their *nonexistence*. Bayle claims that, "search as much as we can into the recesses of the mind, we will not find there any idea of an immobile, indivisible, and penetrable extension" and that proponents of the vacuum are "forced to admit the existence of a nature of which we have no idea" (1991: 379).¹³ Later, he writes:

The demonstrations of our new mathematicians that there is a vacuum have made them realize that motion in a plenum is incomprehensible. They then have accepted the supposition of a vacuum. It is not that they did not find it involved in several inconceivable and inexplicable difficulties; but, having to choose between two theories, both incomprehensible, they preferred the one that repelled them the least. (1991: 383)

¹³ Because Bayle and Hume both claim that we have no idea of a vacuum, it may seem that Hume *agrees with* Bayle on vacuum. But the claim they seem to share is just one premise in one of Bayle's arguments about vacuum. Hume can consistently accept this premise, while rejecting the arguments and the religious goal that Bayle takes them to serve. And even the claim that he accepts this premise must be qualified; as we will see, this premise has an interpretation on which he would reject it (§3). (Thanks to an anonymous referee for raising the issue of Hume's seeming agreement with Bayle.)

In these passages, Bayle is not addressing whether motion and vacuum exist, but whether we have “any idea” of a vacuum (in the former passage), or whether we can comprehend or conceive of motion and vacuum (in the latter). Taken together, these passages suggest what I will call the Inconceivability Argument:

[I1] The conceivability of motion requires that of a vacuum.

[I2] A vacuum is inconceivable.

Therefore,

[I3] Motion is inconceivable.¹⁴

In supporting the Inconceivability Argument’s premise [I2], Bayle again assumes that a vacuum must be *something with extension*—an “immobile, indivisible, and penetrable

¹⁴ Against Bayle, it may be objected that the Inconceivability Argument undermines the Nonexistence Argument: if his opponents cannot understand what they are talking about when they say there is a vacuum, per [I2], then he cannot understand what he is talking about when he says there is not, in the Nonexistence Argument’s premise [N2]. But Bayle would likely welcome this result. As we saw in §1, his main goal is not to show that there is no motion—which he admits he does not believe—but to show that we cannot understand motion (1991: 372, 383–84).

extension”—and that proponents of a vacuum regard it as *something with “existence”* (1991: 379).

Isaac Newton, Samuel Clarke and John Clarke (Samuel’s brother) share the conception of vacuum that informs Bayle’s Zenonian arguments. In their view, a vacuum is an empty region of “absolute space,” which they take to be a real, existing thing.¹⁵ However, Bayle acknowledges that this is not the only conception of vacuum that philosophers have held. He notes that, according to some, “space is at most no more than a privation of body, that it has no reality, and that, properly speaking, the vacuum is nothing” (1991: 380). But Bayle quickly rejects this conception. He claims that it is “unreasonable” and “absurd,” and that “all the modern philosophers who are partisans of the vacuum have abandoned it,” citing Gassendi and Locke as examples (1991: 380). He explains that Locke, in particular, “is too wise not to see that nothing cannot be extended in length, breadth, and depth” (1991: 381). This suggests the following argument: a vacuum must have spatial properties, such as length, breadth and depth; therefore, it must be something, not a mere privation or absence.¹⁶ This argument was influential in the eighteenth century British debate about space (Russell 2008: 100–101, 338n25). But as Joseph Clarke (no relation to Samuel) observes, in a contribution to this debate, the

¹⁵ For Newton’s view of absolute space, see his Scholium to the *Principia* (Newton 1999: 408–15). For Samuel Clarke’s, see his correspondence with Leibniz, especially his Fourth Reply and the footnote to §§36–48 of his Fifth Reply (Leibniz and Clarke 1956: 45–54, 120–21). For John Clarke’s, see the chapter “Of the Nature of Space and Duration,” in his first anonymously published defense of Samuel Clarke (John Clarke 1732: 1–64).

¹⁶ See also “Leucippus,” Rem. G (Bayle 1991: 137).

argument begs the question: those who take a vacuum to be a mere privation or absence will not accept the premise that a vacuum must have spatial properties (Joseph Clarke 1733: 53; see also 22–25, 27–29, 36).

In the years between Bayle’s publishing the *Dictionary* and Hume’s writing the *Treatise*, some philosophers revived the conception of space or vacuum as a mere privation or absence. For example, Joseph Clarke writes that “when we say that SPACE *is* between two Bodies” and when we say “that *nothing is* between them,” “by both those Expressions, we mean no more than that there is not *any Thing really existing between them*” (1733: 11); and that “to say that a *Vacuum*, a *Void*, or *Nothing*, has a *real Existence*, is a direct Contradiction” (1733: 34; see also 14–15, 27–28, 35, 39–41, and 51).

To avoid ambiguity, let us henceforth use the term ‘positive vacuum’ to express vacuum conceived as *a spatial thing that is immobile, indivisible and penetrable*. (Bayle assumes that a positive vacuum would be an *extended* thing. I prefer to say *spatial* thing, to allow for a positive vacuum that is point-sized, hence extensionless.) Let us use the term ‘privative vacuum’ to express vacuum conceived as *the mere privation or absence of spatial things*.

§3 Hume’s answer to Bayle on the vacuum

I now aim to show that Hume’s discussion of vacuum contains answers to the Nonexistence Argument and the Inconceivability Argument. In presenting this interpretation, I will divide his view into three parts: a) positive vacuum is inconceivable; but b) privative vacuum, or what Hume calls “invisible and intangible distance,” is conceivable and possible, contrary to Bayle’s claim that privative vacuum is “absurd” (1991: 380); and c)

the conceivability and possibility of privative vacuum allow for the conceivability and possibility of motion. I will then explain how this affords him answers to Bayle's arguments.

(a) Positive vacuum is inconceivable

Hume would have known the distinction between *positive* and *privative vacuum* from Bayle's article on Zeno: we have seen that Bayle draws this distinction, if only to dismiss privative vacuum as "unreasonable" (1991: 380–81). Hume may also have known this distinction from two further sources.¹⁷ One is Ephraim Chambers's 1728 *Cyclopædia* article on "Vacuum," which distinguishes philosophers who conceive a vacuum to be "a mere privation or nothing" from those who conceive it "actually to exist" (1728: vol. 2, 273). The other is Edmund Law's 1731 English-language edition of William King's *An Essay on the Origin of Evil*, which contains extensive critical commentary by Law.¹⁸ In his essay, King argues that we must conceive a vacuum to be something extended—hence, as a positive vacuum (King 1731: 9, 30, 37–40). In his critical notes, Law argues that we cannot conceive of positive vacuum but can conceive a vacuum to be a mere negation or

¹⁷ For discussion of both these sources in relation to Hume's views on vacuum, see Frasca-Spada 1998: 165–78.

¹⁸ Mossner (1948: 494n12, 496) claims that Hume knew this edition and that some of his memoranda references to Bayle are "lifted" from Law's notes. Pittion (1977: 376) and Stewart (2000: 285) challenge Mossner's evidence for this. Nonetheless, King's essay (in Law's edition or another) seems to me a likely source for the second counter-argument that Hume anticipates about the conceivability of a vacuum (T 1.2.5.3/54–55); for discussion, see below.

absence (King 1731: 9n5). Here, Law rejects the conception of positive vacuum but allows that of privative vacuum.¹⁹

Hume's discussion of vacuum focuses on motivating and defending the claim that it is "impossible to conceive . . . a vacuum and extension without matter" (T 1.2.4.2/40) or, as he also puts it, that "we can form no idea of a vacuum, or space, where there is nothing visible or tangible" (T 1.2.5.1/53). To understand him, we need to know which early modern conception, or conceptions, of vacuum he means to attack. There are several reasons to interpret him as claiming that a *positive vacuum* is inconceivable.

First, his use of the term 'vacuum' indicates that the alleged idea of *positive vacuum* is his target. When he introduces his view that a "vacuum" is inconceivable, he equates "vacuum" with "extension without matter" (T 1.2.4.2/40). Similarly, when he starts to explain this view in detail, he equates "space" with "extension," and then equates "vacuum" with "space [i.e. extension], where there is nothing visible or tangible" (T 1.2.5.1/53; for Hume's equating "space" with "extension," see also T 1.2.3.16/39 and 1.2.5.6/56). He goes on to equate "vacuum" with "extension without matter" or "extension without body" in numerous other paragraphs (T 1.2.5.5–7/55–56, 1.2.5.9/57, 1.2.5.14/58, 1.2.5.22/62; see also T 1.2.5.10/57, where he equates "vacuum" with "pure extension"). Similarly, he later calls the alleged idea of vacuum "an idea of extension without the idea of any object either of the sight or feeling" (T 1.2.5.19/60). So, when Hume claims that we

¹⁹ Law does not insist that vacuum should be conceived as a mere absence. He also allows that it may be conceived as *the extension of body, considered abstractly*; or as *the imaginary subject of such extension* (King 1731: 9n5). He does, however, argue that each of these permissible conceptions leads to the view that space is "nothing *ad extra*, nothing more than an Idea or Conception of the Mind" (Law 1734: 5).

cannot form an idea of a vacuum, he means specifically that we cannot form an idea of *extension without matter*, or of *extension without anything visible or tangible*. This alleged idea would represent the presence of extension, not merely an absence of matter. So, it would represent a positive vacuum, not a privative one. And so, when Hume claims that we cannot form an idea of vacuum, he means specifically that we cannot form an idea of *positive vacuum*. (There is one exception to this general pattern of usage: in the last paragraph of his discussion of vacuum (T 1.2.5.27/64), Hume introduces a second sense of ‘vacuum’, different from the one that he uses throughout the preceding paragraphs. As I interpret it, this paragraph contains his answer to Bayle; I will return to it below.)

Second, Hume’s argument supports only the claim that *positive* vacuum is inconceivable.²⁰ He denies that we can conceive of a vacuum on the grounds that “*the idea of space or extension is nothing but the idea of visible or tangible points, distributed in a certain order*” (T 1.2.5.1/53; see also T 1.2.4.2/39–40). More fully, in Hume’s view, every idea of “space or extension” represents a particular spatial thing, such as his purple table (T 1.2.3.4–5/34). This is true whether the idea is particular or abstract because, in his view, “all abstract ideas are really nothing but particular ones, consider’d in a certain light” (T

²⁰ Falkenstein 2013 reads Hume as giving two arguments that a vacuum is inconceivable (2013: 131). Both assume that a vacuum would be a *spatial thing*, or positive vacuum (2013: 132–33, 134). The first, which Falkenstein calls the “argument from the non-entity of unqualified points,” assumes that a vacuum must be made up of points that are entities, not nonentities (2013: 132–33). The second, which he calls “the argument from the impossibility of forming abstract ideas of manners of disposition,” assumes that a vacuum would involve a “manner of disposition” that “exists in addition to” any things disposed in that manner (2013: 134). So, Falkenstein’s interpretation of these arguments comports with my claim that Hume is arguing that *positive vacuum* is inconceivable.

1.2.3.5/34). Our ideas of particular spatial things are copied from visual impressions of spatially arranged colored points or tactile impressions of spatially arranged tangible points (T 1.2.3.4–5/34, 1.4.5.9/235). So, every idea of “space or extension” that we can form represents a particular spatial thing that is colored or tangible. Hume holds that to conceive something is to form an idea that represents it (T 1.2.2.8/32, 1.2.6.8/67). Taken together, these views imply that the only spatial things we can conceive are colored or tangible—hence, that we cannot conceive of a *positive vacuum*, which would be something spatial yet colorless and intangible. Hume’s premises do not imply that we cannot form other conceptions of a vacuum. For example, an absence of spatial things would be nothing, not something. *A fortiori*, it would not be something spatial. So, Hume’s view that the only spatial things we can conceive are colored or tangible does not imply that we cannot conceive of privative vacuum.

Third, several philosophers who are likely among Hume’s targets, when he argues that a vacuum is inconceivable, focus on positive vacuum. Hume anticipates three counter-arguments against his view: the fact that we dispute whether there is a vacuum shows that we can conceive of one (T 1.2.5.2/54); the fact that we can conceive the annihilation of all the matter in a chamber, without any motion of its walls, floor and ceiling, shows that we can conceive of a vacuum (T 1.2.5.3/54–55); and, since motion is conceivable and possible, so is a vacuum (T 1.2.5.4/55). Hume does not cite sources for these counter-arguments. Variants upon them are common in the early modern literature on vacuum. But these

variants often aim to establish the *actual or possible existence* of a vacuum.²¹ Hume's topic is the *conceivability or inconceivability* of a vacuum. So, his targets here are likely to be philosophers who give these arguments, or variants upon them, as evidence that a vacuum is *conceivable*.

Thus, Locke is a likely source for the first counter-argument, concerning the dispute about a vacuum. He argues that we have an idea of a vacuum on the grounds that “those who dispute for or against a *Vacuum*, do thereby confess that they have distinct *Ideas* of *Vacuum* and *Plenum*” (ECHU 2.13.21;²² see also ECHU 2.13.23). Bayle claims that Locke “made it clear that he took [vacuum] for a positive being” (1991: 380).²³ For the most part, Locke's discussion in the *Essay* bears this claim out.²⁴ He equates an idea of a vacuum with “an *Idea* of Extension void of Solidity” (ECHU 2.13.21), suggesting that this idea represents the presence of extension, not just the absence of spatial things. Also, he asks whether space without body (which, he says, is what vacuum “signifies,” ECHU 2.13.21)

²¹ For example, Locke gives variants on the second and third counter-arguments that aim to establish the possible and actual existence of a vacuum, respectively (ECHU 2.13.21–22). Descartes (1985, vol. 1: 230–31) and Rohault (1735, vol. 1: 28) discuss similar variants on the second counter-argument.

²² References to ‘ECHU’ are to Locke 1975, followed by book, chapter and section numbers.

²³ Joseph Clarke also interpreted Locke in this way: “Mr. *Locke* . . . seems indeed to be of Opinion, that SPACE is something existing” (1733: 25).

²⁴ In concluding his discussion, Locke allows that space may be “only a relation resulting from the Existence of other Beings at a distance” (ECHU 2.13.27). It is arguable that, on this view, a vacuum would be a mere absence: the absence of any third being between two distant ones. But this is the first and only appearance of this view in Locke's discussion of space in the *Essay*. Generally, I will argue, this discussion takes a vacuum to be something spatial, not a mere absence.

is “*Substance or Accident*” (ECHU 2.13.17). This question assumes that empty space is something. If Locke meant to allow that it might be a mere absence, we should expect him to note this third option. Instead, however, he answers the question “I know not” (ECHU 2.13.17) and goes on to speculate that empty space may be a kind of substance (ECHU 2.13.18). In a later chapter, Locke explicitly denies that there is nothing “beyond the bounds of Body,” on the grounds that God is not confined within the limits of matter (ECHU 2.15.2), and says “methinks it ascribes a little too much to Matter, to say, where there is no Body, there is nothing” (ECHU 2.15.3); here, he may mean to identify space with God’s immensity (Russell 2008: 337n9). Taken together, these passages suggest that Locke takes empty space to be something, or positive vacuum.

William King is a likely source for the second counter-argument that Hume anticipates, concerning the annihilation of a chamber’s contents. In *An Essay on the Origin of Evil*, King claims that “the *conception* of *Space* is distinct from the conception of *Matter*” (1731: 14). To support this, he writes that “when the whole Material World is annihilated in the Mind, the Idea of Space remains, as a thing yet existing” (1731: 30). He also claims that “We can in Thought remove all the Matter out of a Vessel, or Chamber, and the Space interjacent between the Walls remains extended in length, breadth, and depth” (1731: 37–38). His topic here is “Space, as far as we can conceive it” (1731: 39): he is arguing for the conceivability of a vacuum, not its actual or possible existence. King’s arguments here explicitly concern positive vacuum: he claims that we conceive of empty space “as a thing yet existing” (1731: 30) and that, when we conceive the annihilation of all the matter in a chamber, we are left conceiving an empty region of space that is a “Subject of Extension,” or a “thing *Long, Broad and Deep*” (1731: 40).

Bayle's article on Zeno is a likely source for the third counter-argument, concerning motion. Unlike the other two, this counter-argument concerns both the possibility and the conceivability of motion and a vacuum (T 1.2.5.4/55). As we have seen, Bayle argues both that the *possibility* of motion requires that of a vacuum, in connection with the Nonexistence Argument ("If there were motion, it would be necessary that there be a vacuum," 1991: 377), and that the *conceivability* of motion requires that of a vacuum, in connection with the Inconceivability Argument ("motion in a plenum is incomprehensible," 1991: 383).²⁵ As we have also seen, Bayle's arguments focus on positive vacuum because, he claims, the conception of privative vacuum is "unreasonable" and "absurd," and has no currency in early modern philosophy (1991: 380).

So, several philosophers who are likely among Hume's targets, in his discussion of vacuum, focus on positive vacuum. This is a third reason for interpreting Hume as targeting the alleged conception of positive vacuum.

Of course, if Boehm, Garrett and Russell are right that Hume means to target Newtonian advocates of absolute space, this is a further reason for interpreting him as arguing that positive vacuum is inconceivable.²⁶ As we have seen, an empty region of absolute space, as Newton and Clarke conceive it, would be an example of positive vacuum.

²⁵ Of course, Bayle does not infer that a vacuum is possible and conceivable. But he does endorse this counter-argument's major premise that motion is possible and conceivable only if a vacuum is.

²⁶ For citations, see the introduction, above.

In Hume's view, then, positive vacuum is inconceivable. I will now argue that he allows we *can* conceive of privative vacuum, or what he calls "invisible and intangible distance."

(b) Privative vacuum is conceivable and possible

While responding to the three counterarguments that he anticipates, Hume distinguishes what he calls "two kinds" or "species" of distance (T 1.2.5.17/59, 1.2.5.19/60, 1.2.5.21/62). One involves bodies separated by a "real extension" (T 1.2.5.14/58, 1.2.5.27/64). The other is what Hume calls "invisible and intangible distance" (T 1.2.5.16/59, 1.2.5.24/63, 1.2.5.25/63, 1.2.5.26n/638–39, 1.2.5.27/64). I will argue that the latter is an example of what I have called *privative vacuum* and that, in Hume's view, "invisible and intangible distance" or privative vacuum is both conceivable and possible.

Let us say that two bodies are *arranged distantly* when they are spatially related but non-contiguous. By *non-contiguous*, I mean: arranged in such a way that a third body could be placed between them, without overlapping or displacing either of the original two. The "two kinds of distance" (T 1.2.5.17/59, 1.2.5.19/60) that Hume distinguishes are two ways in which bodies can be arranged distantly. First, bodies can be arranged distantly in virtue of being separated by *something spatial*—an extended composite of colored or tangible points, or what Hume calls a "real extension" (T 1.2.5.14/58, 1.2.5.27/64). As an example, he invites us to imagine holding up our hand, with fingers spread, against the backdrop of the blue sky. In this case, our fingers are separated by an extended composite of blue points (T 1.2.5.8/56).

In Hume's view, this is not the only way in which bodies can be arranged distantly. To show this, he invites us to suppose that we are in complete darkness—that is, completely deprived of “colour'd and visible objects” (T 1.2.5.5/55)—and that “luminous bodies” then appear to us, without illuminating anything else in the vicinity (T 1.2.5.8/56). He claims that, when two luminous bodies appear to us in this way, “we can perceive, whether they be conjoin'd or separate; whether they be separated by a great or small distance; and if this distance varies, we can perceive its encrease or diminution, with the motion of the bodies” (T 1.2.5.10/57). In his view, then, two luminous bodies in an otherwise dark environment may be arranged distantly: as he says here, they may be “separated by a great or small distance”; in subsequent paragraphs, he repeatedly describes such bodies as “distant objects” (T 1.2.5.16/59, 1.2.5.17/59, 1.2.5.18/59, 1.2.5.24/63). However, between two such bodies, there is no “real extension”—no extended composite of colored or tangible points. Hume therefore speaks of a second “kind of distance,” which he calls “invisible and intangible distance.”²⁷

²⁷ Objection (compare Falkenstein 2013: 147–48): Hume does not endorse the claim that two luminous bodies in an otherwise dark environment can be distant from each other. In the next paragraph, he rejects it: “This is our most natural and familiar way of thinking; but which we shall learn to correct by a little reflection” (T 1.2.5.11/57). Reply: The “natural and familiar way of thinking” that Hume means to “correct” *does not include* the claim that the luminous bodies can be distant from each other. *After* saying that “we can perceive, whether [the luminous bodies] be conjoin'd or separate, whether they be separated by a great or small distance,” and so forth, but *before* saying that “we shall learn to correct” a certain “natural and familiar way of thinking,” Hume says: “it may be thought that there is here a vacuum or pure extension” (T 1.2.5.10/57). Here, the phrase “it may be thought” indicates that he is *now* presenting a claim that he will not ultimately endorse. When he proceeds to write that we shall learn to correct this way of thinking, he means to reject just

This case of “invisible and intangible distance” involves *visible* objects. Hume also allows for cases involving *tangible* objects (T 1.2.5.9/56–57).²⁸ But these introduce philosophical complications that are tangential to my main line of argument here.²⁹ I will therefore set them aside, and focus on cases involving only visible objects, like the luminous bodies we have considered.

Sometimes, Hume misleadingly speaks as if “invisible and intangible distance” were *a third thing* located between the two luminous bodies. For example, he speaks of

this claim—that “there is here a vacuum or pure extension”—*not* the earlier claim that we can perceive whether the luminous bodies are conjoined or separate, and so forth. Later paragraphs confirm this: Hume repeatedly describes objects like the luminous bodies as “distant objects” (T 1.2.5.16/59, 1.2.5.17/59, 1.2.5.18/59, 1.2.5.24/63).

²⁸ For discussion of such cases, see Boehm 2012: 82, 85–89.

²⁹ For example, Hume holds that we perceive the tangible objects *successively*, in these cases (T 1.2.5.9/56–57), so he needs to explain how we interpret successive tactile impressions as representations of objects that are *simultaneously* distant from each other. I suspect this is why he says that “invisible and intangible distance” involving tangible objects is “imaginary” (T 1.2.5.13/58): because we perceive these objects successively, we must imaginatively interpret our successive impressions as representations of simultaneously distant objects, in order to form a representation of “invisible and intangible distance.” (Boehm claims that Hume regards “invisible and intangible distance” *in general* as imaginary, hence not really a distance (2012: 85–89). But he nowhere says that such distance involving visible objects is imaginary. As Boehm notes (2012: 85), he does once call it “fictitious” (T 1.2.5.23/62), but it is not clear that ‘fictitious’ means *imaginary*, in his usage (see Traiger 1987). He may call “invisible and intangible distance” *fictitious* because it induces us to misapply an idea (T 1.2.3.11/37), due to our confusing the idea of such distance with that of objects separated by a “real extension” (T 1.2.5.14–21/58–62). I discuss this misapplication of an idea, and some interpretive difficulties concerning Hume’s use of the terms ‘fiction’ and ‘fictitious’, in Cottrell 2016.)

these bodies' being "separated by a great or small distance" (T 1.2.5.10/57) and of "the invisible and intangible distance, interpos'd betwixt two objects" (T 1.2.5.26n/638). In doing so, he misrepresents his view. If "invisible and intangible distance" were *a thing*, it would presumably be *an extended thing*, stretching from one luminous body to the other. But Hume holds that all extended things are made up of colored or tangible points (T 1.2.4.3/40, 1.2.5.14/58). So, he cannot consistently hold that "invisible and intangible distance" is a *thing*.

In fact, Hume denies that there is anything located between the two luminous bodies, in a case of "invisible and intangible distance." True, he writes of "the very distance, which is interpos'd betwixt them" (T 1.2.5.11/57), as if this distance were a third thing that is spatially related to the bodies. But he immediately clarifies that this distance "is nothing but darkness, or the negation of light; without parts, without composition, invariable and indivisible" (T 1.2.5.11/57). By 'darkness', Hume does not mean *a composite of black points*, but rather *the absence of anything colored and visible*:³⁰ he writes that "the idea of darkness is no positive idea, but merely the negation of light, or more properly speaking, of colour'd and visible objects" (T 1.2.5.5/55) and calls the darkness surrounding the two luminous bodies "a perfect negation of light, and of every colour'd and visible object" (T 1.2.5.11/57). According to Hume, then, "invisible and intangible distance" is darkness, and darkness is a mere negation or absence. So, "invisible and intangible distance" is a mere negation or absence.

³⁰ Here, I disagree with Jacquette (2001: 81–82).

We can now see that what Hume calls “invisible and intangible distance” is an example of what I have called *privative vacuum*: an absence of spatial things.³¹ For Hume, to say that there is an “invisible and intangible distance” between two bodies is to say: these bodies are arranged distantly but have nothing visible or tangible—hence, for Hume, no spatial thing—located between them.

I will now argue that, in Hume’s view, “invisible and intangible distance” or *privative vacuum* is both conceivable and possible. Let us start with the claim that it is *conceivable*. Some readers may balk at this, for the following reason. As noted above, Hume holds that conceiving something is forming an idea that represents it (T 1.2.2.8/32, 1.2.6.8/67). Every idea is either copied from an impression or (if it is a complex idea) wholly composed of ideas that are so copied (T 1.1.1.3–9/2–5). And every impression presents us with a particular positive thing: a sensible quality (such as a color, sound or

³¹ Objection: In his footnote to T 1.2.5.26, Hume allows that “invisible and intangible distance” may be “full of *body*” (T 1.2.5.26n/639); so, “invisible and intangible distance” cannot be *privative vacuum*. Reply: In the same note, Hume distinguishes questions about “the *appearances* of objects to our senses” from questions about objects’ “real nature and operations” (T 1.2.5.26n/638), and says that only the former concern him. When we ask if “invisible and intangible distance” is “always full of *body*,” we “carry our enquiry beyond the appearances of objects to our senses” (T 1.2.5.26n/639). So, this is not the kind of question that concerns Hume. He can consistently hold that, *as far as appearances are concerned*, there is nothing between the distant bodies in a case of “invisible and intangible distance,” while remaining agnostic about whether there is *really* anything between them. My claim that “invisible and intangible distance” is *privative vacuum* is a claim about appearances—the only kind of claim that Hume makes here. For discussion of Hume’s appearance/reality distinction and its significance, see Ainslie 2010: 61–66 and Baxter 2009, especially 112–18.

taste), a passion or an emotion (T 1.1.6.1/15–16). So, it may be objected, no idea can represent a privative vacuum, or absence of spatial things. Rather, each must represent a positive thing, or arrangement of such things.

I reply: This argument shows that no idea can represent *merely* an “invisible and intangible distance” or privative vacuum. But it allows that an idea might represent such a distance *in addition to* representing certain positive things. I have argued that, for Hume, to say that there is an “invisible and intangible distance” between certain bodies is to say that these bodies are arranged distantly but have no spatial thing located between them. Suppose that an idea represents two or more bodies *as being arranged distantly while having no spatial thing located between them*. This idea does not represent merely an “invisible and intangible distance,” for it represents certain positive things: the distantly arranged bodies. But, because of the way it represents these bodies as being arranged, this idea represents “invisible and intangible distance” in addition to representing these bodies. When I claim that “invisible and intangible distance” or privative vacuum is conceivable, I mean: we can form an idea that represents two or more bodies as being arranged distantly while having no spatial thing located between them.

Hume allows that we have impressions from which we can copy such an idea.³² As we have seen, he writes that “when two luminous bodies appear to the eye,” in an otherwise

³² Falkenstein recognizes this (2015: 63), but regards it as problematic for Hume: according to Falkenstein, allowing that we have such impressions *is* allowing that we have impressions of a vacuum; and this conflicts with Hume’s view that we cannot form an idea of a vacuum (2015: 62–65). By my lights, this objection to Hume trades on an equivocation between the two senses of ‘vacuum’ that I have distinguished: Hume allows that we have impressions from which we can derive an idea of “invisible and intangible distance” or *privative*

dark environment, “we can perceive, whether they be conjoin’d or separate” and (if they are separate) “whether they be separated by a great or small distance” (T 1.2.5.10/57). Suppose that two luminous bodies “appear to the eye” and we perceive them to be “conjoin’d” or contiguous. In this case, we must have a complex visual impression with parts corresponding to each of the two bodies. Now, suppose instead that these bodies appear to the eye but we perceive them to be “separate” or distant. In this case, we must again have a complex visual impression with parts corresponding to each of the two bodies. But these parts of our impression must be related differently from those in the previous case: they must be related so that the impression is of bodies that are arranged distantly, not of bodies that are contiguous. Otherwise, we could not discriminate perceptually between the two cases: we could not “perceive, whether [the two luminous bodies] be conjoin’d or separate.” In Hume’s view, then, when we are confronted with two distant luminous bodies in an otherwise dark environment, we have a distinctive kind of complex visual impression: an impression of luminous bodies that are arranged distantly while having no spatial thing located between them. From this distinctive kind of visual impression, we can copy a complex idea that represents “invisible and intangible distance” or privative vacuum, in the sense explained above.³³

vacuum; this does not conflict with his view that we cannot form an idea of a *positive* vacuum. For further discussion of this type of objection to Hume, see §4, below.

³³ Objection: An idea copied from such an impression would not *represent* the luminous bodies *as not having* any spatial thing located between them. Rather, it would merely *not represent* them *as having* any spatial thing located between them—that is, it would be silent as to whether or not they have a spatial thing located between them. So, it would not represent privative vacuum. Reply: This raises the difficult issue of whether Hume can account satisfactorily for negation. I agree that an idea could not represent privative vacuum just

So, Hume's views about the derivation of ideas from impressions allow for an idea that represents "invisible and intangible distance." This is just as well because, as I will now argue, he is committed to saying that we have such an idea.

In his discussion of vacuum, Hume argues that we are prone to an illusion, due to a "mistake" in which we "confound" certain ideas (T 1.2.5.14–21/58–62). The illusion consists in "falsly imagin[ing] we can form such an idea" as that of "a vacuum or extension without matter" (T 1.2.5.14/58) or, as Hume later says, "imagin[ing] we have an idea of extension without the idea of any object either of the sight or feeling" (T 1.2.5.19/60).³⁴ According to some scholars, the illusion that Hume means to attribute to us here is *the illusion that we have an idea of "invisible and intangible distance."*³⁵ But this does not fit Hume's own descriptions of the illusion. We have seen that, in general, he equates "vacuum" with "extension without matter" or positive vacuum (see §3a, above). His

in virtue of being copied from a complex visual impression of the kind described here. But I think that, by applying an account of negation modeled on his accounts of abstract ideas and the ideas of substances and modes (see Cottrell forthcoming), Hume could explain how an idea copied from such an impression can represent the luminous bodies *as not having* any spatial thing located between them—hence, can represent privative vacuum. For helpful discussions of Hume on negation, see also Garrett 2015: 75–77 and Powell 2014.

³⁴ It is a nice question how we can *falsely* imagine that we can form such an idea. It seems plausible that, to imagine this, we must imagine ourselves forming such an idea; and that, to imagine ourselves forming such an idea, we must actually form such an idea; hence that we cannot *falsely* imagine that we can form such an idea. For a defense of Hume against this type of objection, amenable to the interpretation that I offer here, see Baxter 2009: 137–38.

³⁵ For example, this seems to be Falkenstein's interpretation (2013: 148–50, esp. 149).

descriptions of the illusion fit this general pattern: he says that we falsely imagine we can form an idea of “a vacuum or *extension* without matter” or “an idea of *extension* without the idea of any object either of the sight or feeling” (italics added). For Hume, then, the illusion consists in falsely imagining we can form an idea that represents *the presence of extension* where there is nothing material, visible or tangible. So, the illusion he means to attribute to us is *the illusion that we have an idea of positive vacuum*, not the illusion that we have an idea of “invisible and intangible distance” or privative vacuum.

In fact, as other scholars observe,³⁶ Hume presupposes that we have an idea of “invisible and intangible distance,” when explaining how we fall prey to the illusion that we have an idea of positive vacuum. His account of this illusion has two parts. In the first part, at T 1.2.5.14–18/58–59, he explains that there are “three relations betwixt that distance, which conveys the idea of extension, and that other, which is not fill’d with any colour’d or solid object” (T 1.2.5.18/59). That is, there are three relations between the “two kinds of distance” (T 1.2.5.19/60), or two ways for bodies to be arranged distantly, that we considered above: i) bodies arranged distantly while having a composite of visible or tangible points located between them (“that distance, which conveys the idea of extension,” or “real extension”); and ii) bodies arranged distantly while having no spatial thing located between them (“that other [distance], which is not fill’d with any colour’d or solid object,” or “invisible and intangible distance”). The “three relations” are explained at T 1.2.5.15–17/58–59. First, “two visible objects appearing in the midst of utter darkness”—that is,

³⁶ For example, see Allison 2008: 57 and Johnson 1995: 102–3. These scholars regard this presupposition as objectionable because they think Hume cannot consistently allow that we have an idea of “invisible and intangible distance.” For discussion and defense of Hume, see §4, below.

objects in a case of “invisible and intangible distance”—affect the senses in the same way as two visible objects that have a real extension between them (T 1.2.5.15/58–59).³⁷ Second, objects in a case of “invisible and intangible distance” can have a real extension placed between them without their being overlapped or displaced; as Hume puts it, “an invisible and intangible distance may be converted into a visible and tangible one, without any change on the distant objects” (T 1.2.5.16/59). Third, the “two kinds of distance” affect natural phenomena, such as heat, light and attraction, similarly (T 1.2.5.17/59). Hume later adds that these three relations include two resemblances (the first and third relations) and one causal relation (the second relation) (T 1.2.5.21/62).

In the second part of his account, at T 1.2.5.19–21/60–62, Hume explains that these relations induce us to “mistake” or “confound” two ideas, in accordance with the “general maxim” that “wherever there is a close relation betwixt two ideas, the mind is very apt to mistake them, and in all its discourses and reasonings to use the one for the other” (T 1.2.5.19/60); to say that two ideas have a “close relation” is to say that they are associated with each other, in accordance with the theory of association presented earlier in the *Treatise* (T 1.1.4, “Of the connexion or association of ideas”).³⁸ Hume reminds us that, according to this theory of association, “*resemblance*, *contiguity* and *causation*” are

³⁷ Hume originally added that “two visible objects appearing in utter darkness” also “form the same angle by the rays, which flow from them, and meet in the eye” as two visible objects with a real extension between them (T 1.2.5.15/58–59). However, he retracts this part of his account in the Appendix, on the grounds that “these angles are not known to the mind” (T App 22/636).

³⁸ This becomes clear when Hume applies his “general maxim” at T 1.2.5.20–21/60–62: here, he appeals to association-inducing relations of resemblance and causation to explain how ideas come to be “closely connected” (T 1.2.5.21/62).

“principles of union among ideas” (T 1.2.5.20/60). He now adds that these principles—especially resemblance—are “source[s] of error” (T 1.2.5.21/61). When ideas are associated, this leads us to “mistake them” or “confound” them in certain mental activities (T 1.2.5.21/61). Due to this mistake, we falsely “imagine” that we have an idea that differs from each of the original two. In this case, mistaking or confounding our ideas of the two kinds of distance leads us to imagine, falsely, that we have “an idea of extension without the idea of any object either of the sight or feeling” (T 1.2.5.19/60)—that is, an idea of positive vacuum. Hume does not spell out this last step of his account in detail. Presumably, he thinks that confounding i) an idea that represents bodies as arranged distantly while having *something extended* located between them (as in a case of “real extension”) with ii) an idea that represents bodies as arranged distantly while having *nothing visible or tangible* located between them (as in a case of “invisible and intangible distance”) leads us to think and speak as if we could form iii) an idea that represents bodies as arranged distantly while having *something extended but neither visible nor tangible* located between them—that is, while having *positive vacuum* located between them.

This account presupposes that we have ideas of both kinds of distance. If we did not, then the relations among these two kinds of distance, described in the first part of Hume’s account (T 1.2.5.14–18/58–59), could not give rise to an association of ideas; and so, the illusion that we have an idea of positive vacuum could not be generated by this association, as described in the second part of Hume’s account (T 1.2.5.19–21/60–62). In Hume’s view, then, we have an idea that represents “invisible and intangible distance”: that is, an idea that represents two or more bodies as arranged distantly while having no spatial thing located between them.

To summarize: Hume holds that we are prone to the illusion that we have an idea of positive vacuum. The cognitive process that generates this illusion takes two ideas as input: i) an idea that represents bodies as arranged distantly while having something extended—a composite of colored or tangible points—located between them (“real extension”); and ii) an idea that represents bodies as arranged distantly while having nothing visible or tangible—hence, for Hume, no spatial thing—located between them (“invisible and intangible distance” or privative vacuum). These ideas come to be associated due to relations of resemblance and causation among the things they represent (T 1.2.5.14–18/58–59, 1.2.5.21/62), and this association between the two ideas leads to the illusion that we have a third idea, which differs from each of the original two: an idea of positive vacuum (T 1.2.5.19–21/60–62). This account presupposes that we actually have each of the two ideas that serve as input to the process. So, it presupposes that we have an idea of “invisible and intangible distance” or privative vacuum.

I conclude that, in Hume’s view, “invisible and intangible distance” or privative vacuum is *conceivable*: we can form an idea that represents two or more bodies as being arranged distantly while having no spatial thing located between them. Importantly, this idea *does not* represent the distant bodies as having something spatial located between them. It thereby differs *both* from an idea of bodies separated by a “real extension” *and* from the alleged idea of a positive vacuum between two bodies, which would represent these bodies as having something spatial—a positive vacuum—located between them.

Miren Boehm and Lorne Falkenstein interpret this part of Hume’s discussion differently. According to Boehm, “the idea of an invisible and intangible distance is not at all the idea of a *distance*” (2012: 81). If this means that the idea Hume calls that of

“invisible and intangible distance” does not represent two or more objects *as arranged distantly*, then it conflicts with my interpretation. Similarly, according to Falkenstein, we have no idea of “invisible and intangible distance,” but confusedly take ourselves to have one (2013: 149). As I understand these scholars, their main reason for their interpretation is that, in their view, Hume would be inconsistent if he allowed that we have an idea of “invisible and intangible distance” while denying that we have an idea of a vacuum. Boehm asks: “if the invisible and intangible distance is indeed a distance, then how is it *not* empty space or extension without matter or a vacuum?” (2012: 83). Similarly, Falkenstein claims that bodies arranged distantly, with no other body between them, would give rise to an empty space or vacuum (2013: 140–41) and that, if Hume allowed that we sensorily perceive bodies’ being arranged in this way, this would be “tantamount to accepting that a vacuum is immediately perceived” (2013: 159). I will address this in §4 by arguing that, as I interpret him, Hume is *consistent* in allowing that we have an idea of “invisible and intangible distance” while denying that we have an idea of what he calls a “vacuum.”

I have argued that, for Hume, “invisible and intangible distance” or privative vacuum is *conceivable*. There is also evidence that he regards it as *possible*. He writes: “[t]ho’ there be nothing visible or tangible interpos’d betwixt two bodies, yet we find *by experience*, that the bodies may be plac’d in the same manner, with regard to the eye, and require the same motion of the hand in passing from one to the other, as if divided by something visible or tangible” (T 1.2.5.25/63). That is, experience testifies to the possibility of objects or “bodies” that are “plac’d” or arranged distantly but have no spatial thing located between

them—hence, that are arranged so as to leave privative vacuum between them.³⁹ In Hume’s view, then, privative vacuum is possible as well as conceivable.

We have seen Bayle claim that privative vacuum is *impossible* because “nothing cannot be extended in length, breadth and depth” (1991: 381). In response to Hume, then, Bayle would likely argue as follows: If two bodies are arranged distantly, then there must be something spatial—a spatial substance or a spatial mode—located between them. So, there cannot be two bodies that are arranged distantly but have no spatial thing located between them. And so, there cannot be two bodies arranged so as to leave privative vacuum between them.

This argument assumes that, whenever two bodies are arranged distantly, there is some third spatial thing, located between and separating them. But we have seen that Hume rejects this assumption: in his view, there are cases of “invisible and intangible distance,” where two bodies are arranged distantly but have no spatial thing located between them. “[W]e find *by experience*” that bodies can be arranged in this way (T 1.2.5.25/63): for example, when we perceive two “separate” luminous bodies in an otherwise dark environment, we perceive them to be arranged distantly (that is, to be spatially related but non-contiguous) and to have no spatial thing located between them (T 1.2.5.10/57). And in

³⁹ Hume sometimes claims that whatever is conceivable is possible (T 1.2.2.8/32, 1.3.3.3/79–80, 1.4.5.10/236, Abs 11/650). If this is his considered view and I am right that he regards “invisible and intangible distance” as conceivable, then he is also committed to regarding it as possible. However, Hume is sometimes more circumspect, claiming only that whatever is *clearly* (or *clearly and distinctly*) conceivable is possible (T 1.1.7.6/19–20, 1.2.2.8/32, 1.4.5.5/233). Instead of arguing that “invisible and intangible distance” can be clearly conceived, I offer T 1.2.5.25/63 as independent evidence that he regards such distance as possible.

Hume's view, "experience and observation" is "the only solid foundation we can give" to the science of man (T Intro 7/xvi). Bayle may insist, for alleged *a priori* reasons, that bodies cannot be arranged in this way. But by Hume's lights, this would be contrary to proper scientific method.

(c) The conceivability and possibility of privative vacuum allow for the conceivability and possibility of motion

Hume argues as follows that motion is conceivable and possible, even though a positive vacuum is inconceivable (T 1.2.5.24/63). We can conceive of "invisible and intangible distance" or privative vacuum: that is, we can conceive of objects as being arranged distantly while having no spatial thing located between them. When we conceive of two objects in this way, we can conceive of a third object's being created between them without overlapping or displacing anything. This involves conceiving of *a newly existent object*, which was not previously between the two distantly arranged ones, as coming to be between them without overlap or displacement. If we can do this, Hume reasons, then we can equally conceive of *a third object that already existed*, which was not previously between the two distantly arranged ones, as coming to be between them without overlapping or displacing anything. And conceiving this change of spatial relations *is* conceiving the third object as moving in between the two distantly arranged ones. So, if we can conceive of "invisible and intangible distance" or privative vacuum, then we can conceive of motion.

Similarly, Hume argues, the *possibility* of "invisible and intangible distance" allows for that of motion. If two objects *can be* distantly arranged while having no spatial thing

located between them, then a third object *can move* in between these two, without overlapping or displacing anything (T 1.2.5.24/63, 1.2.5.25/63).⁴⁰

In Hume's view, then, since "invisible and intangible distance" or privative vacuum is conceivable and possible, so is motion. Note that this is not to attribute causal powers to "invisible and intangible distance" itself: Hume is not saying that "invisible and intangible distance" *causally explains* the conceivability or possibility of motion; this would be

⁴⁰ It may seem that "invisible and intangible distance" is not special, in permitting motion without overlap or displacement. Consider again Hume's example of fingers spread against the backdrop of a blue sky. Is it not conceivable and possible for a further object to move between our fingers—say, for a white bird to fly across the blue expanse between them—without overlapping or displacing anything? Hume is committed to saying no: in the scenario just described, there must be either overlap or displacement. This is because, in his view, our visual impressions are two-dimensional; only the sense of touch affords us three-dimensional spatial impressions (see T 1.2.5.8/56, 1.4.2.9/191 and Hume's letter to Hugh Blair of 4 July, 1762, in Wood 1986: 416). Strictly speaking, when we see (what we would call) our fingers, spread against the backdrop of the blue sky, we are visually aware only of a two-dimensional arrangement of colored points: flesh-colored points, composing our fingers; and blue points, composing the sky. If we saw a white bird flying across the gap between our fingers, this would have to involve the overlapping or displacement of some blue points by the white points composing our bird-impression. Otherwise, there would be no way to fit these white points into the two-dimensional array of points that composes our overall visual impression. If our fingers were at an "invisible and intangible distance," however—for example, if we held them up against a perfectly dark night sky—then there would be no colored points between them. In this case, an object could move in between them, without overlapping or displacing anything. "Invisible and intangible distance" is unique, in permitting motion without overlap or displacement. Thanks to an anonymous referee for pressing me to consider this. (Allison 2008: 46–49 and 2016 disputes whether Hume regards visual impressions as two-dimensional. It seems to me that T 1.4.2.9/191 is decisive evidence that he does, despite Allison's claim to the contrary (2008: 347n24).)

untenable, because “invisible and intangible distance” is a mere absence and, as such, cannot have causal powers. Rather, as I interpret him, Hume is merely arguing that *if* we can conceive of objects that are arranged distantly but have no spatial thing located between them, *then* we can conceive of motion; and that *if* it is possible for objects to be so arranged, *then* motion is possible.

Hume’s answer to Bayle

Hume’s discussion of motion and “invisible and intangible distance” contains answers to Bayle’s vacuum-based arguments for fideism. Its concluding paragraph contains a dilemma for the Nonexistence Argument, the premises of which are:

[N1] Motion requires a vacuum.

[N2] There is no vacuum.

Hume writes:

I shall conclude this subject of extension with a paradox, which will easily be explain’d from the foregoing reasoning. This paradox is, that if you are pleas’d to give to the invisible and intangible distance, or in other words, to the capacity of becoming a visible and tangible distance, the name of a vacuum, extension and

matter are the same, and yet there is a vacuum.^[41] If you will not give it that name, motion is possible in a plenum, without any impulse *in infinitum*, without returning in a circle, and without penetration. (T 1.2.5.27/64)

Here, Hume offers two options, concerning the term ‘vacuum’. First, we may use this term in such a way that “invisible and intangible distance” counts as vacuum. (For example, we may use it to mean *privative vacuum*.) If we do so, it is correct to say that “there is a vacuum,” because there are cases of “invisible and intangible distance.” So, if Bayle uses the term ‘vacuum’ in this way, premise [N2] is false. Second, we may use this term in such a way that “invisible and intangible distance” does not count as vacuum. (For example, if we use it to mean *positive vacuum*—insofar as we can grasp this meaning—then “invisible and intangible distance” will not count as vacuum, because it is not a thing.) If we do so, then, even if there is no vacuum, motion is possible because there are cases of “invisible and intangible distance” and this allows for motion. (Hume expresses this by saying that “motion is possible in a plenum”: if we use the term ‘vacuum’ in such a way that “invisible and intangible distance” does not count as vacuum, then the contrast term, ‘plenum’, will apply to the universe, even if there are cases of “invisible and intangible distance.”) So, if

⁴¹ This sentence suggests that “invisible and intangible distance” *is* a “capacity of becoming a visible and tangible distance.” But this is hard to reconcile with Hume’s view that we can simply perceive (rather than infer) luminous bodies, in otherwise complete darkness, to be distant from each other (T 1.2.5.10/57, 1.2.5.23/62). Therefore, I think he should stop at the weaker claim—suggested by earlier paragraphs—that cases of “invisible and intangible distance” involve objects that are arranged in a distinctive “manner” and that *also* have a capacity of receiving visible or tangible objects between them, without overlap or displacement (T 1.2.5.16/59, 1.2.5.24/63 and 1.2.5.25/63–64).

Bayle uses the term ‘vacuum’ in this second way, [N1] is false. And so, Hume can reject the Nonexistence Argument as a fallacy of equivocation: there is no consistent way of using the term ‘vacuum’, such that both of its premises are true.

In an important footnote, Hume also addresses Bayle’s claim that “Huygens, Newton, etc.” have proven [N1] to be true. By Hume’s lights, [N2] is true only if ‘vacuum’ is taken to mean *positive vacuum* (insofar as we can grasp this meaning). So, the Newtonian philosophy can help Bayle only if it supports the interpretation of [N1] on which this premise means that motion requires a positive vacuum. Hume claims that the Newtonian philosophy does not support this interpretation of [N1]. “[R]ightly understood,” it supports only what Hume will grant: that motion requires “invisible and intangible distance,” or privative vacuum:

[I]f it be ask’d, whether or not the invisible and intangible distance be always full of body, or of something that by an improvement of our organs might become visible or tangible, I must acknowledge, that I find no very decisive arguments on either side; tho’ I am inclin’d to the contrary opinion, as being more suitable to vulgar and popular notions. If *the Newtonian* philosophy be rightly understood, it will be found to mean no more. A vacuum is asserted: That is, bodies are said to be plac’d after such a manner, as to receive bodies between them, without impulsion or penetration. (T 1.2.5.26n/639)

Of course, not all Newtonians understand their philosophy “rightly,” by Hume’s lights: Newton and Clarke purport to believe⁴² in a form of positive vacuum—empty regions of absolute space. Eric Schliesser suggests that, here and elsewhere, Hume “re-describes” or “reinterprets” Newtonian philosophy (2007: §§3, 4.2). When the Newtonian philosophy is reinterpreted in Hume’s preferred way, it fails to sustain Clarke’s rational theology, which is premised on the existence of absolute space (see Russell 2008: 99–103).

Hume’s distinction between difference uses of the term ‘vacuum’ also allows him to answer Bayle’s Inconceivability Argument, the premises of which are:

[I1] The conceivability of motion requires that of a vacuum.

[I2] A vacuum is inconceivable.

Suppose we use the term ‘vacuum’ so that “invisible and intangible distance” counts as vacuum. In that case, [I2] is false because such distance, or privative vacuum, is conceivable. Suppose, instead, that we use the term ‘vacuum’ so that “invisible and intangible distance” does not count as vacuum. In that case, [I1] is false because conceiving such distance allows us to conceive of motion. Again, Bayle’s argument is a fallacy of equivocation: there is no consistent way of using the term ‘vacuum’, such that both of its premises are true.

⁴² If Hume is correct, Newton and Clarke cannot *actually* believe in positive vacuum, because—given Hume’s account of what a belief is (T 1.3.7.5/96)—this would require an idea of positive vacuum.

Admittedly, Hume does not mention Bayle by name in the passages presented here (or anywhere in his discussion of space and time). But we have seen that he recommended Bayle's article on Zeno as background to the *Treatise*; engages with this article extensively in his discussion of space and time, without citing or mentioning it; and, in particular, answers its divisibility-based argument for fideism (§1). In light of this, it is unlikely to be a coincidence that these passages contain answers to the vacuum-based arguments for fideism that Bayle presents in the same article.

§4 A long-standing objection to Hume

I now aim to show that my interpretation allows for a novel defense of Hume against a long-standing objection: that he is inconsistent in denying that we can conceive of a vacuum, while allowing that we can conceive of “invisible and intangible distance.” This objection dates at least to T. H. Green's nineteenth century commentary on the *Treatise* (Green 1886: 237–38). Henry Allison gives a recent version of it.⁴³

As we saw in §3, Hume explains that “we falsely imagine we can form” an idea of a positive vacuum because we confuse an idea of “invisible and intangible distance” with an idea of objects separated by a “real extension.” Allison describes this account as follows: “Hume attempted to explain how, due to certain resemblances, we tend to conflate our idea of an imaginary empty space with a real filled one (constituted by an array of colored or tangible points)” (2008: 57). Here, Allison calls an idea of “invisible and intangible distance” an “idea of an imaginary empty space,” and an idea of objects separated by a “real extension” an idea of “a real filled [space].” He continues: “The problem is that the

⁴³ For other recent versions, see Falkenstein 2015: 62–65 and Johnson 1995: 102–3.

possibility of this conflation presupposes that we already have an idea of such an empty space, which is the very thing that Hume wants to deny being possible” (2008: 57). In Allison’s view, then, an idea of “invisible and intangible distance” *is* an idea of a vacuum or “empty space,” and allowing that we can form this idea conflicts with Hume’s view that we cannot form an idea of a vacuum. So, Hume is committed to this inconsistent triad:

[H1] We cannot form an idea of a vacuum.

[H2] We can form an idea of “invisible and intangible distance.”

[H3] An idea of “invisible and intangible distance” *is* an idea of a vacuum.

Recent articles by Boehm and Falkenstein suggest that Hume would answer this objection by denying [H2], thereby avoiding the inconsistency. As we have seen, Boehm claims that, for Hume, “the idea of an invisible and intangible distance is not at all the idea of a *distance*” (2012: 81). If this means that the idea Hume calls that of “invisible and intangible distance” does not represent colored or tangible objects *as being arranged distantly*, then it conflicts with [H2], as I understand it. Hence, if Boehm’s interpretation is correct, Hume would answer the long-standing objection by denying [H2]. Similarly, Falkenstein claims that, in Hume’s view, “We cannot even so much as conceive what we mean by the words “invisible and intangible distance” . . . [A]ll ideas of purportedly invisible and intangible distances are really ideas of visible and tangible distances. We have no impression or idea, simple or complex, of the invisible or intangible distance we take our ideas of visible or

tangible distances to represent. Our views to the contrary are the result of confusion” (Falkenstein 2013: 149). So, for Falkenstein, as for Boehm, Hume’s answer to the long-standing objection is to avoid the inconsistency by denying [H2].

However, Falkenstein himself argues that the view he and Boehm attribute to Hume is untenable. In order to explain the illusion that we can conceive of a positive vacuum, Hume needs to say that we confuse the idea of objects separated by real extension with *some other idea*. But if he denies [H2], then he cannot give a satisfactory account of what this *other idea* represents (Falkenstein 2013: 150–60). Falkenstein concludes that Hume’s account of our imaginative confusion is “unsustainable” (2013: 160).

Falkenstein’s argument may show that *if denying [H2] were Hume’s only possible answer to the long-standing objection*, then his position would be untenable. But we need not accept that Hume’s position *is* untenable, because Hume need not answer the long-standing objection by denying [H2]. In light of §3, we can offer him the following, more satisfactory reply. The objection equivocates on the word ‘vacuum’. Hume means to claim only that we cannot form an idea of a *positive vacuum*. So, he will accept [H1] only when the word ‘vacuum’ is used to mean *positive vacuum*. (Of course, in Hume’s view, this meaning is defective because we can form no idea corresponding to it. It may be better to call it a putative meaning of the word ‘vacuum’.) An idea of “invisible and intangible distance” represents objects *as arranged distantly while having no spatial thing located between them*. This idea does not represent a positive vacuum between these objects. To do so, it would need to represent them as having a spatial thing located between them. So, when the word ‘vacuum’ is used to mean positive vacuum, Hume is committed to [H1] but *not* to [H3].

We have seen that, when answering Bayle's Nonexistence Argument, Hume allows a different use of 'vacuum', in which this term would apply to "invisible and intangible distance" (T 1.2.5.27/64). But, when the word 'vacuum' is used in this way, he will say that we *can* form an idea of a vacuum; so, he is committed to [H3] but *not* to [H1].

We can now see that Hume is committed to both [H1] and [H3] only if the word 'vacuum' is used differently in these two statements. So, contrary to what Allison and others claim, there is no genuine inconsistency in his views here.⁴⁴

Some of Falkenstein's work suggests the following reply on behalf of Hume's critics: an idea of "invisible and intangible distance" *would* represent *something spatial* (or *some spatial things*) between the distant objects—namely, *unoccupied locations*. For example, Falkenstein writes: "For there to be a gap between two points, there would have to be a location between them that is not occupied by either of them" (2015: 39). Elsewhere, he suggests that an unoccupied location would be something, not nothing: "A point that lacks all extension and that lacks any visible or tangible quality still has a feature that makes it something rather than nothing, namely a location relative to other points" (2013: 161). Taken together, these passages suggest that an idea of "invisible and intangible distance"

⁴⁴ This reply also serves to answer a related objection, recently pressed by Falkenstein: that Hume makes damaging concessions, in allowing that "invisible and intangible distance" is perceivable, conceivable and possible (Falkenstein 2013: 145–46). These allowances concern only *privative vacuum*, not *positive vacuum*. So, *pace* Falkenstein, they are not concessions to the views Hume means to oppose, on which positive vacuum is conceivable and possible. Hume's "concessions" seem damaging only if we misconstrue the target of his attack on the conceivability of a vacuum. He is attacking only the alleged conception of positive vacuum, not every conception of a vacuum whatsoever.

must represent a positive vacuum, made up of unoccupied locations, between the distant objects.

Hume would not accept this claim. He holds that, in a situation involving “invisible and intangible distance,” there is only “darkness” between the distant bodies and, as we have seen, this darkness is nothing—“a perfect negation of light, and of every colour’d or visible object” (T 1.2.5.11/57)—not a spatial thing or things. So, our idea of “invisible and intangible distance” represents objects *as being arranged distantly*, without representing any spatial thing located between them and, *a fortiori*, without representing unoccupied locations located between them.

Hume could justify this view by appealing to his Separability Principle, which states that “whatever objects are different are distinguishable, and . . . whatever objects are distinguishable are separable by the thought and imagination” (T 1.1.7.3/18). If an unoccupied location were something, then it would be something that is neither colored nor tangible. So, it would be something different from any colored or tangible object. And so, by the Separability Principle, it would be “separable by the thought and imagination” from any colored or tangible object: that is, we could conceive of it alone, without conceiving of anything colored or tangible. But, in Hume’s view, we cannot conceive of any spatial locations without conceiving of colored or tangible points that are spatially “dispos’d” or arranged (T 1.2.3.4–5/34, 1.2.3.12–16/38–39, 1.2.4.2/39–40). So, an unoccupied location is not something.

This argument makes two key interpretive assumptions. First, anything that is genuinely *something*—not a mere absence—counts as an ‘object’, in the sense that is relevant to the Separability Principle. Second, ‘x is separable by the thought and

imagination from any F' implies 'x can be conceived without conceiving any F'. Defending these assumptions is beyond this paper's scope.

Falkenstein considers a related argument and replies that unoccupied locations need not be separable from colored or tangible objects, just as a window in a brick wall need not be separable from the bricks that surround it (2013: 140–41, 161). By Hume's lights, however, this reply concedes that unoccupied locations are not "objects" or genuine *things*—hence, that they could not compose a positive vacuum.

I conclude that Hume's discussion of vacuum, as interpreted in §3, does not fall prey to the long-standing objection.

Conclusion

It is widely recognized that Bayle's article "Zeno of Elea" contains a divisibility-based argument for fideism, which Hume means to answer in his discussion of divisibility (§1). I have tried to show that this article also contains two vacuum-based arguments for fideism—the Nonexistence Argument and the Inconceivability Argument—and that Hume's discussion of vacuum contains answers to them (§§2–3). Based on this interpretation, I have offered a novel defense of Hume against a long-standing objection to his views about vacuum (§4).⁴⁵

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REFERENCES

- Ainslie, Donald C. 2010. "Adequate Ideas and Modest Scepticism in Hume's Metaphysics of Space." *Archiv für Geschichte der Philosophie* 92: 39–67.
- Ainslie, Donald C. 2015. *Hume's True Scepticism*. New York: Oxford University Press.
- Allison, Henry E. 2008. *Custom and Reason in Hume: A Kantian Reading of the First Book of the Treatise*. New York: Oxford University Press.
- Allison, Henry E. 2016. "Hume and the Molyneux Problem." In Paul Russell (ed.), *The Oxford Handbook of Hume*, 158–72. New York: Oxford University Press.
- Baxter, Donald L. M. 2008. *Hume's Difficulty: Time and Identity in the Treatise*. New York: Routledge.
- Baxter, Donald L. M. 2009. "Hume's Theory of Space and Time in Its Skeptical Context." In *The Cambridge Companion to Hume*, 2nd edn., edited by David Fate Norton and Jacqueline Taylor, 105–46. New York: Cambridge University Press.
- Bayle, Pierre. 1991. *Historical and Critical Dictionary, Selections*, translated and edited by Richard H. Popkin. Indianapolis: Hackett
- Boehm, Miren. 2012. "Filling the Gaps in Hume's Vacuums." *Hume Studies* 38: 79–99.
- Chambers, Ephraim. 1728. *Cyclopædia*. 2 vols. London.
- [Clarke, John.] 1732. *A Defence of Dr. Clarke's Demonstration of the Being and Attributes of God, &c.* London.

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- Clarke, Joseph. 1733. *Dr. Clarke's Notions of Space Examin'd*. London.
- Cottrell, Jonathan. 2016. "A Puzzle about Fictions in the *Treatise*." *Journal of the History of Philosophy* 54(1): 47–73.
- Cottrell, Jonathan. Forthcoming. "Unperceived Existence and Hume's Theory of Ideas." *Oxford Studies in Early Modern Philosophy*.
- Descartes, René. 1985. *The Philosophical Writings of Descartes*. 2 vols. Translated by John Cottingham, Robert Stoothoff and Dugald Murdoch. New York: Cambridge University Press.
- Falkenstein, Lorne. 2006. "Space and Time." In *The Blackwell Guide to Hume's Treatise*, edited by Saul Traiger, 59–76. Oxford: Blackwell.
- Falkenstein, Lorne. 2013. "Hume on the Idea of a Vacuum." *Hume Studies* 39: 131–68.
- Falkenstein, Lorne. 2015. "The Ideas of Space and Time and Spatial and Temporal Ideas in *Treatise* 1.2." In *The Cambridge Companion to Hume's Treatise*, edited by Donald C. Ainslie and Annemarie Butler, 31–68. New York: Cambridge University Press.
- Flew, Antony. 1976. "Infinite Divisibility in Hume's *Treatise*." In *Hume: A Re-Evaluation*, edited by Donald W. Livingston and James T. King, 257–69. New York: Fordham University Press.
- Fogelin, Robert J. 1985. *Hume's Skepticism in the Treatise of Human Nature*. London: Routledge and Kegan Paul.
- Frasca-Spada, Marina. 1998. *Space and the Self in Hume's Treatise*. Cambridge: Cambridge University Press.
- Garrett, Don. 1997. *Cognition and Commitment in Hume's Philosophy*. New York:

- Oxford University Press.
- Garrett, Don. 2015. *Hume*. New York: Routledge
- Green, T. H. 1882. "General Introduction." In *A Treatise of Human Nature*. Vol. 1.
Edited by T. H. Green and T. H. Grose, 1–299. London: Longmans Green.
- Hume, David. 1932. *The Letters of David Hume*. 2 vols. Edited by J. Y. T. Greig. New
York: Oxford University Press.
- Hume, David. 1975. *Enquiries Concerning Human Understand and Concerning the
Principles of Morals*. Edited by L. A. Selby-Bigge. 3rd edn. by P. H. Nidditch.
Oxford: Clarendon Press.
- Hume, David. 1978. *A Treatise of Human Nature*. Edited by L. A. Selby-Bigge. 2nd edn.
by P. H. Nidditch. Oxford: Clarendon Press.
- Hume, David. 2000. *An Enquiry Concerning Human Understanding*. Edited by Tom L.
Beauchamp. Oxford: Clarendon Press.
- Hume, David. 2007. *A Treatise of Human Nature, Vol. 1: Texts*. Edited by David Fate
Norton and Mary J. Norton. Oxford: Clarendon Press.
- Irwin, Kristen. 2013. "Bayle on the (Ir)rationality of Religious Belief." *Philosophy
Compass* 8/6: 560–69
- Jacquette, Dale. 2001. *David Hume's Critique of Infinity*. Leiden: Brill.
- Johnson, Oliver. 1995. *The Mind of David Hume*. Urbana and Chicago: University of
Illinois Press.
- Kemp Smith, Norman. 1941. *The Philosophy of David Hume*. New York: Palgrave
Macmillan.
- King, William. 1731. *An Essay on the Origin of Evil*. Translated and edited by Edmund

- Law. London.
- Labrousse, Elisabeth. 1983. *Bayle*. Translated by Denys Potts. New York: Oxford University Press.
- Larivière, D. Anthony and Thomas M. Lennon. 2002. "The History and Significance of Hume's Burning Coal Example: Time, Identity, and Individuation." *Journal of Philosophical Research* 27: 511–26.
- Law, Edmund. 1734. *An Enquiry into the Ideas of Space, Time, Immensity, and Eternity*. Cambridge.
- Leibniz, Gottfried and Samuel Clarke. 1956. *The Leibniz–Clarke Correspondence*. Edited by H. G. Alexander. Manchester: Manchester University Press.
- Locke, John. 1975. *An Essay concerning Human Understanding*. Edited by P. H. Nidditch. Oxford: Clarendon Press.
- Miller, Jon Charles. 2013. "Hume's Citation of Strabo and the Dating of the Memoranda." *Hume Studies* 39: 197–202.
- Mossner, Ernest Campbell. 1948. "Hume's Early Memoranda, 1729–1740: The Complete Text." *Journal of the History of Ideas*, 9: 492–518.
- Newton, Isaac. 1999. *The Principia: Mathematical Principles of Natural Philosophy*. Translated and edited by I. Bernard Cohen and Anne Whitman. Berkeley and Los Angeles: University of California Press.
- Pittion, J. P. 1977. "Hume's Reading of Bayle: An Inquiry into the Source and Role of the Memoranda." *Journal of the History of Philosophy*, 15(4): 373–86.
- Popkin, Richard H. 1964. "So, Hume did Read Berkeley." *The Journal of Philosophy*, 61: 773–78.

- Powell, Lewis. 2014. "Hume's Treatment of Denial in the *Treatise*." *Philosophers' Imprint*, 14(26): 1–22.
- Rohault, Jacques. 1735. *System of Natural Philosophy*. 2 vols. Translated by John Clarke. London.
- Russell, Paul. 2008. *The Riddle of Hume's Treatise: Skepticism, Naturalism, and Irreligion*. New York: Oxford University Press.
- Ryan, Todd. 2009. *Pierre Bayle's Cartesian Metaphysics: Rediscovering Early Modern Philosophy*. New York: Routledge.
- Sakamoto, Tatsuya. 2011. "Hume's "Early Memoranda" and the Making of His Political Economy." *Hume Studies* 37: 131–64.
- Schliesser, Eric. 2007. "Hume's Newtonianism and Anti-Newtonianism," *The Stanford Encyclopedia of Philosophy* (Winter 2008 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/win2008/entries/hume-newton/>
- Stewart, M. A. 2000. "The Dating of Hume's Manuscripts." In Paul Wood (ed.), "The Scottish Enlightenment: Essays in Reinterpretation," 267–314. (Rochester, NY: University of Rochester Press)
- Traiger, Saul. 1987. "Impressions, Ideas, and Fictions." *Hume Studies*, 13: 381–99.
- Watts, Isaac. 1733. *Philosophical Essays on Various Subjects*. London.
- Wollaston, William. 1722. *The Religion of Nature Delineated*.
- Wood, P. B. 1986. "David Hume on Thomas Reid's *An Inquiry into the Human Mind, On the Principles of Common Sense*: A New Letter to Hugh Blair from July 1762." *Mind*, 95: 411–16.
- Wright, John P. 1983. *The Sceptical Realism of David Hume*. Minneapolis: University of

Minnesota Press.